

WHAT IS CLAIMED IS:

1. A process of expressing a recombinant protein in a plant and of isolating the recombinant protein from the plant, the process comprising the steps of:

- (a) providing a plant, a plant derived tissue or cultured plant cells expressing a fusion protein including the recombinant protein and a cellulose binding peptide being fused thereto, said fusion protein being compartmentalized within cells of said plant, plant derived tissue or cultured plant cells, so as to be sequestered from cell walls of said cells of said plant, plant derived tissue or cultured plant cells;
- (b) homogenizing said plant, plant derived tissue or cultured plant cells, so as to bring into contact said fusion protein with a plant derived cellulosic matter of said plant, plant derived tissue or cultured plant cells, to thereby effect affinity binding of said fusion protein via said cellulose binding peptide to said cellulosic matter, thereby obtaining a fusion protein cellulosic matter complex; and
- (c) isolating said fusion protein cellulosic matter complex.

2. The process of claim 1, further comprising the step of:

- (d) washing said fusion protein cellulosic matter complex, thereby removing endogenous plant proteins and other plant material therefrom.

3. The process of claim 2, further comprising the step of:

- (e) collecting said fusion protein cellulosic matter complex as a final product of the process

4. The process of claim 2, further comprising the step of:

- (e) exposing said fusion protein cellulosic matter complex to conditions effective in dissociating said fusion protein from said cellulosic matter; and
- (f) isolating said fusion protein, thereby obtaining an isolated fusion protein.

5. The process of claim 4, wherein said conditions effective in dissociating said fusion protein from said cellulosic matter are selected from the group consisting of basic conditions, denaturative conditions and affinity displacement conditions.

6. The process of claim 4, further comprising the step of:

(g) exposing said isolated fusion protein to conditions effective in digesting said fusion protein so as to release said recombinant protein therefrom, thereby obtaining a released recombinant protein.

7. The process of claim 6, wherein said conditions effective in digesting said fusion protein so as to release said recombinant protein therefrom are selected from the group consisting of proteolysis effected via a protease and proteolysis effected under predetermined cis or trans conditions for digesting a controllable intervening protein sequence.

8. The process of claim 4, further comprising the step of:

(h) isolating said released recombinant protein.

9. The process of claim 2, further comprising the step of:

(e) exposing said fusion protein cellulosic matter complex to conditions effective in digesting said fusion protein so as to release said recombinant protein therefrom, thereby obtaining a released recombinant protein.

10. The process of claim 6, wherein said conditions effective in digesting said fusion protein so as to release said recombinant protein therefrom are selected from the group consisting of proteolysis effected via a protease and proteolysis effected under predetermined cis or trans conditions for digesting a controllable intervening protein sequence.

11. The process of claim 4, further comprising the step of:

(f) isolating said released recombinant protein.

12. A genetically modified or viral infected plant or cultured plant cells expressing a fusion protein including a recombinant protein and a cellulose binding peptide, said fusion protein being compartmentalized

within cells of said plant or cultured plant cells, so as to be sequestered from cell walls of said cells of said plant or cultured plant cells.

13. The genetically modified or viral infected plant or cultured plant cells of claim 12, wherein expression of said fusion protein is under a control of a constitutive or tissue specific plant promoter.

14. The genetically modified or viral infected plant or cultured plant cells of claim 12, wherein said fusion protein is compartmentalized within a cellular compartment selected from the group consisting of cytoplasm, endoplasmic reticulum, golgi apparatus, oil bodies, starch bodies, chloroplastids, chloroplasts, chromoplastids, chromoplasts, vacuole, lysosomes, mitochondria, and nucleus.

15. A genetically modified or viral infected plant or cultured plant cells expressing a fusion protein including a recombinant protein and a cellulose binding peptide separated therebetween via a unique amino acid sequence recognizable and digestible by a protease or under predetermined cis or trans conditions for digesting a controllable intervening protein sequence.

16. The genetically modified or viral infected plant or cultured plant cells of claim 15, wherein said fusion protein is compartmentalized within cells of said plant or cultured plant cells, so as to be sequestered from cell walls of said cells of said plant or cultured plant cells.

17. The genetically modified or viral infected plant or cultured plant cells of claim 15, wherein said fusion protein is compartmentalized within a cellular compartment selected from the group consisting of cytoplasm, endoplasmic reticulum, golgi apparatus, oil bodies, starch bodies, chloroplastids, chloroplasts, chromoplastids, chromoplasts, vacuole, lysosomes, mitochondria, and nucleus.

18. The genetically modified or viral infected plant or cultured plant cells of claim 15, wherein expression of said fusion protein is under a control of a constitutive or tissue specific plant promoter.

19. A composition of matter comprising:
- (a) a plant derived cellulosic matter of a plant; and
 - (b) a fusion protein including a recombinant protein and a cellulose binding peptide separated therebetween via a unique amino acid sequence recognizable and digestible by a protease or under predetermined cis or trans conditions for digesting a controllable intervening protein sequence, said fusion protein being expressed in said plant and complexed to said plant derived cellulosic matter of said plant by affinity binding via said cellulose binding peptide.
20. A nucleic acid molecule comprising:
- (a) a promoter sequence for directing protein expression in plant cells;
 - (b) a heterologous nucleic acid sequence including:
 - (i) a first sequence encoding a cellulose binding peptide;
 - (ii) a second sequence encoding a recombinant protein, wherein said first and second sequences are joined together in frame; and
 - (iii) a third sequence encoding a unique amino acid sequence being recognizable and digestible by a protease or under predetermined cis or trans conditions for digesting a controllable intervening protein sequence, said third sequence being between and in frame with said first and second sequences;

wherein, said heterologous nucleic acid sequence being down stream said promoter sequence, such that expression of said heterologous nucleic acid sequence is effectable by said promoter sequence.

21. The nucleic acid molecule of claim 20, further comprising a sequence element selected from the group consisting of an origin of replication for propagation in bacterial cells, at least one sequence element for integration into a plant's genome, a polyadenylation recognition sequence, a transcription termination signal, a sequence encoding a translation start site, a sequence encoding a translation stop site, plant RNA virus derived sequences, plant DNA virus derived sequences, tumor inducing (Ti) plasmid derived sequences, and a transposable element derived sequence.

22. A nucleic acid molecule comprising:
- (a) a promoter sequence for directing protein expression in plant cells;
 - (b) a heterologous nucleic acid sequence including:
 - (i) a first sequence encoding a cellulose binding peptide;
 - (ii) a second sequence encoding a recombinant protein, wherein said first and second sequences are joined together in frame; and
 - (iii) a third sequence encoding a signal peptide for directing a protein to a cellular compartment, said third sequence being upstream and in frame with said first and second sequences;

wherein, said heterologous nucleic acid sequence being down stream said promoter sequence, such that expression of said heterologous nucleic acid sequence is effectable by said promoter sequence.

23. The nucleic acid molecule of claim 22, wherein said heterologous nucleic acid sequence further includes

- (iv) a fourth sequence encoding a unique amino acid sequence being recognizable and digestible by a protease or under predetermined cis or trans conditions for digesting a controllable intervening protein sequence, said fourth sequence being between and in frame with said first and second sequences.

24. The nucleic acid molecule of claim 22, further comprising a sequence element selected from the group consisting of an origin of replication for propagation in bacterial cells, at least one sequence element for integration into a plant's genome, a polyadenylation recognition sequence, a transcription termination signal, a sequence encoding a translation start site, a sequence encoding a translation stop site, plant RNA virus derived sequences, plant DNA virus derived sequences, tumor inducing (Ti) plasmid derived sequences, and a transposable element derived sequence.

25. The nucleic acid molecule of claim 22, wherein said cellular compartment is selected from the group consisting of cytoplasm, endoplasmic reticulum, golgi apparatus, oil bodies, starch bodies,

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chloroplastids, chloroplasts, ~~chromoplastids~~, chromoplasts, vacuole,
lysosomes, mitochondria, and nucleus.

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